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**PATENT
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Appl. No.: 10/823,953
Applicant: SIGWORTH, William D.
Filed : April 13, 2004
Title : COUPLING AGENTS FOR NATURAL FIBER-FILLED POLYOLEFINS
TC/A.U. : 1714
Examiner: Cain, E.
Docket No.: 0176PA-CIP (UNI164US)

APPELLANT'S AMENDED APPEAL BRIEF

Sir:

The above-identified Appellant submits this Appellant's Amended Appeal Brief pursuant to 37 C.F.R. § 41.37(d). The Notice of Appeal was filed on June 8, 2006.

The official fee of \$500 for filing a brief in support of an appeal was submitted with the initial Appeal Brief. If any other fees are due charge them to our Deposit Account Number 23-2656. A duplicate copy of this page is enclosed.

Remarks begins on page 2.

Appellant's Amended Appeal Brief begins on page 3.

Remarks

Pursuant to the Examiner's Notification of Non-Compliant Appeal Brief, the Appellant amended the statement of the status of claims by indicating the rejected and canceled claims and removed the prosecution history discussion. The Appellant amended the summary of claimed subject matter with concise explanations of the subject matter defined in each of the independent claims involved in the appeal. The 35 U.S.C. § 112 rejection was included in the grounds for rejection section of the amended appeal brief. Finally, the Wolcott et al. reference was added to the argument section headings of rejections of claim 15.

Pursuant to 37 C.F.R. 41.37 (c) and (d), an examiner reviews an appeal brief to ensure the required items of the brief are present and will issue a notification of non-compliance if the brief does not comply with the requirements of paragraph (c). Examiner Thexton went beyond the review for the required items of 37 C.F.R. 41.37 (c) and made a substantive argument under the first paragraph entitled "Other" on page two of the notification. This issue is not appropriate for a notification of non-compliance, and so the Appellant has not addressed this matter. The rejection under 35 U.S.C. § 112 will be addressed at the appropriate time.

The Appellant believes that this Amended Appeal Brief is now in compliance with 37 C.F.R. 41.37 (c) and relies on the following authorities and arguments to maintain the appeal.

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1. Real Party in Interest

The real party in interest for this matter is the Appellants' assignee. The assignee and real party in interest is Chemtura Corporation, formerly known as Crompton Corporation, Benson Road, Middlebury, Connecticut 06749.

2. Related Appeals and Interferences

There are no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

3. Status of Claims

Claims 7 and 9 are rejected under 35 U.S.C. § 112, second paragraph; claims 1 through 7, 9, and 11 through 14 are rejected under 35 U.S.C. § 103(a); and claim 15 is rejected under 35 U.S.C. § 103(a). Claims 8 and 10 have been canceled by the Appellant.

4. Status of Amendments

All amendments filed in the application have been entered.

5. Summary of Claimed Subject Matter

In one embodiment detailed in the specification on page 4, lines 7 through 12, on page 5, line 18, through page 6, line 12, on page 7, line 6, through page 8, line 11, and claims 1 through 13, the present invention is directed to a process for preparing a composite material comprising mixing together at least one natural fiber, at least one polypropylene resin, and at

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least one functionalized polypropylene coupling agent to provide the composite material. The polypropylene coupling agent comprises at least one polar monomer per 100 grams of functionalized polypropylene coupling agent and has a molecular weight distribution of greater than 2.5 (M_w/M_n by GPC). (See specification on page 4, lines 7 through 12, on page 5, line 18, through page 6, line 12, on page 7, line 6, through page 8, line 11, and claims 1 through 13.)

In another aspect detailed in the specification on page 4, lines 13 through 18, on page 7, line 20 through page 8, line 11, and claim 14, the present invention is directed to a composite material prepared by a process comprising mixing together at least one natural fiber, at least one polypropylene resin, and at least one functionalized polypropylene coupling agent to provide said composite material. The coupling agent comprises more than one mmole of at least one polar monomer per 100 grams of polymer and has a molecular weight distribution of greater than 2.5 (M_w/M_n by GPC). (See specification on page 4, lines 13 through 18, on page 7, line 20 through page 8, line 11, and claim 14.)

In a third aspect detailed in the specification on page 4, line 19 through page 5, line 2, on page 7, line 20 through page 8, line 11, on page 13, lines 22 through 25, on page 16, lines 5 through 8, and claim 15, the present invention is directed to a composite material comprising at least one natural fiber, at least one polypropylene resin, at least one functionalized polypropylene coupling agent, and at least one lubricant selected from the group consisting of fatty acid amides and fatty acid esters. The coupling agent comprises more than one mmole of at least one polar monomer per 100 grams of polypropylene and has a molecular weight distribution of greater than 2.5 (M_w/M_n by GPC). (See specification on page 4, line 19

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through page 5, line 2, on page 7, line 20 through page 8, line 11, on page 13, lines 22 through 25, on page 16, lines 5 through 8, and claim 15.)

6. Grounds of Rejection to Be Reviewed on Appeal

Claims 7 and 9 were rejected under 35 U.S.C. 112, second paragraph, as indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 through 14 were rejected under 35 U.S.C. § 103(a) as obvious over “Epolene Polymers” (publication WA-5E, November 2002, Eastman Chemical Company) taken with evidentiary reference “Epolene Waxes” (publication F-301E, December 1996, Eastman Chemical Company), claim 15 was rejected under 35 U.S.C. § 103(a) as obvious over “Epolene Polymers” taken with evidentiary reference “Epolene Waxes” in view of Wolcott et al., claims 1 through 14 were rejected under 35 U.S.C. § 103(a) as obvious over Godavarti et al. (U.S. Patent No. 6265037-B1) in view of “Epolene Polymers” taken with evidentiary reference “Epolene Waxes,” and claim 15 was rejected 35 U.S.C. § 103(a) as obvious over Godavarti et al. (U.S. Patent No. 6265037-B1) in view of “Epolene Polymers” taken with evidentiary reference “Epolene Waxes.”

7. **Argument**

(a) **Examiner's 35 U.S.C. § 112, second paragraph, rejection regarding the use of "polypropylene resin" in claims 7 and 9**

The Examiner rejected claims 7 and 9 under 35 U.S.C. § 112, second paragraph, as indefinite for failing to particularly point out which use of polypropylene resin from claim 1 is claimed. The Applicant believes that amending both claims 7 and 9 by adding the term "at least one" before the term "polypropylene resin" would make claims 7 and 9 definite and the Examiner's 35 U.S.C. § 112, second paragraph, rejection moot. This rejection is otherwise traversed, and reversal of the rejection is requested.

(b) **Examiner's 35 U.S.C. § 103(a) rejection of claims 1-7, 9, and 11-14 as unpatentable over "Epolene Polymers" taken with evidentiary reference "Epolene Waxes"**

The Examiner rejected claims 1-7, 9, and 11-14 under 35 U.S.C. § 103(a) as unpatentable over "Epolene Polymers" (publication WA-5E, November 2002, Eastman Chemical Company) taken with evidentiary reference "Epolene Waxes" (publication F-301E, December 1996, Eastman Chemical Company). The Examiner cites the maleated polyolefins C-16, C-18, and E-43 in "Epolene Polymers" in support of the rejection. This rejection is respectfully traversed.

The present invention, as amended, relates to a composite material comprising mixing at least one natural fiber, at least one polypropylene resin, and at least one functionalized polypropylene coupling agent to provide the composite material; wherein the functionalized polypropylene coupling agent possesses a molecular weight distribution of greater than 2.5 (M_w/M_n by GPC) and comprises a base polypropylene resin that is grafted with a total of more

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than about 1 mmole of at least one polar monomer per 100 grams of functionalized polypropylene coupling agent, and a process for preparing the composite material. The Applicant has demonstrated the unexpected advantage of using a polypropylene coupling agent which has a molecular weight distribution of greater than 2.5 (M_w/M_n by GPC). See Examples, beginning on page 10 of the specification.

Neither "Epolene Polymers" nor "Epolene Waxes" teaches or suggests that a functionalized polypropylene coupling agent that possesses a molecular weight distribution of greater than 2.5 should or could be used in natural fiber composite material. C-16 and C-18 are maleated polyethylenes, and E-43 has a MWD of 2.3. Accordingly, the ordinary person skilled in the art would not have been led to the Applicant's claimed invention based on the description in "Epolene Polymers" or "Epolene Waxes," alone or in combination.

Reconsideration of the rejection of claims 1-7, 9, and 11-14 under 35 U.S.C. § 103(a), as unpatentable over "Epolene Polymers" taken with evidentiary reference "Epolene Waxes," is respectfully requested.

(c) Examiner's 35 U.S.C. § 103(a) rejection of claim 15 as unpatentable over "Epolene Polymers" taken with evidentiary reference "Epolene Waxes" in view of Wolcott et al.

The Examiner rejected claim 15 under 35 U.S.C. § 103(a) as unpatentable over "Epolene Polymers" taken with evidentiary reference "Epolene Waxes" and further in view of Wolcott et al. This rejection is respectfully traversed.

The Applicant's claimed invention in claim 15 relates to a natural fiber composite material comprising at least one polypropylene resin, at least one functionalized polypropylene coupling agent, and at least one lubricant selected from the group consisting of

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fatty acid amides and fatty acid esters; wherein the functionalized polypropylene coupling agent possesses a molecular weight distribution of greater than 2.5.

The deficiencies of the “Epolene Polymers” and “Epolene Waxes” has been discussed above, i.e., neither reference, alone or in combination, teaches or suggests that a functionalized polypropylene coupling agent that possesses a molecular weight distribution of greater than 2.5, should or could be used in natural fiber composite material.

Wolcott et al. describe the use of certain waxes (Zn-stearate, EBS, OP-100) in certain wood composite materials comprising polypropylene or polyethylene. Wolcott et al. do not teach or suggest that a functionalized polypropylene coupling agent that possesses a molecular weight distribution of greater than 2.5, should or could be used in the wood composite material.

Furthermore, the coupling agents useful in Applicant’s claimed invention show surprisingly superior performance in lubricated systems. For example, compare the formulation containing the 2% of the coupling agent of this invention and 3% of the fatty acid amide ethylene bis-stearamide (Example 28 in Table 5 of the present specification) with the Wolcott et al. sample containing 2% of MA-PP wax and 1% of ethylene bis-stearamide (second from bottom in Table 3). Compared to controls that did not contain either coupling agent or lubricant, the sample of the present invention showed a 37% increase in flexural strength versus only a 12% increase for the Wolcott et al. sample.

Accordingly, none of Wolcott et al., “Epolene Polymers,” or “Epolene Waxes” teaches or suggests that a functionalized polypropylene coupling agent that possesses a molecular weight distribution of greater than 2.5 should or could be used in lubricated natural

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fiber composite material. Accordingly, the ordinary person skilled in the art would not have been led to the Applicant's claimed invention based on the descriptions in Wolcott et al., "Epolene Polymers" or "Epolene Waxes," alone or in combination. Reconsideration of the rejection of claim 15 under 35 U.S.C. § 103(a) as unpatentable over "Epolene Polymers" taken with evidentiary reference "Epolene Waxes" and further in view of Wolcott et al., is respectfully requested.

(d) Examiner's 35 U.S.C. § 103(a) rejection of claims 1-7, 9, and 11-14 as unpatentable over Godavarti et al. in view of "Epolene Polymers" taken with evidentiary reference "Epolene Waxes"

The Examiner rejected claims 1-7, 9, and 11-14 under 35 U.S.C. § 103(a) as unpatentable over Godavarti et al. (U.S. 6,265,037 B1) in view of "Epolene Polymers" taken with evidentiary reference "Epolene Waxes." This rejection is respectfully traversed.

Applicant's invention in claims 1-7, 9, and 11-14 has been discussed above. The deficiencies of "Epolene Polymers" and "Epolene Waxes" have also been discussed above.

Godavarti et al. describe certain polyolefin wood fiber composite materials useful for structural members. Godavarti et al. do not teach or suggest that a functionalized polypropylene coupling agent that possesses a molecular weight distribution of greater than 2.5 should or could be used in the wood fiber composite material. The maleated polypropylene coupling agents used in Godavarti et al. for which there are MW and functionality data are Epolene E-43, G-3003, and G-3015. E-43 has MWD of 2.3. G-3003 and G-3015 each have a MWD of 1.9.

Accordingly, none of Godavarti et al., "Epolene Polymers," or "Epolene Waxes" teaches or suggests that a functionalized polypropylene coupling agent that possesses a

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molecular weight distribution of greater than 2.5 should or could be used in wood fiber composite material. Accordingly, the ordinary person skilled in the art would not have been led to Applicant's claimed invention based on the descriptions in Godavarti et al., "Epolene Polymers," or "Epolene Waxes," alone or in combination. Reconsideration of the rejection of claims 1-7, 9, and 11-14 under 35 U.S.C. § 103(a) as unpatentable over Godavarti et al. in view of "Epolene Polymers" taken with evidentiary reference "Epolene Waxes," is respectfully requested.

(e) Examiner's 35 U.S.C. § 103(a) rejection of claim 15 as unpatentable over Godavarti et al. in view of "Epolene Polymers" taken with evidentiary reference "Epolene Waxes" and in further view of Wolcott et al.

The Examiner rejected claim 15 under 35 USC § 103(a) as unpatentable over Godavarti et al. in view of "Epolene Polymers" taken with evidentiary reference "Epolene Waxes" and further in view of Wolcott et al. This rejection is respectfully traversed.

The Applicant's invention in claim 15 has been discussed above. The deficiencies of all of the references Godavarti et al., "Epolene Polymers," "Epolene Waxes," and Wolcott et al., have been discussed above.

None of Godavarti et al., Wolcott et al., "Epolene Polymers," or "Epolene Waxes" teaches or suggests that a functionalized polypropylene coupling agent that possesses a molecular weight distribution of greater than 2.5 should or could be used in lubricated natural fiber composite material. Accordingly, the ordinary person skilled in the art would not have been led to the Applicant's claimed invention based on the descriptions in Godavarti et al., Wolcott et al., "Epolene Polymers," or "Epolene Waxes," alone or in combination. Reconsideration of the rejection of claim 15 under 35 U.S.C. § 103(a) as unpatentable over

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Godavarti et al., in view of “Epolene Polymers” taken with evidentiary reference “Epolene Waxes” and further in view of Wolcott et al., is respectfully requested.

Conclusion

The Examiner has inappropriately combined the cited references and neither reference alone nor in combination discloses or suggests the present invention. Appellant requests that the rejections of claims 7 and 9 under 35 U.S.C. § 112, second paragraph, and the rejections under 35 U.S.C. § 103(a) be withdrawn and the application be given favorable consideration.

8. Claims Appendix

An appendix is attached that contains a copy of the claims, as amended, that are involved in this appeal.

9. Evidence Appendix

The Appellant does not rely on additional evidence in this appeal.

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10. Related Proceedings Appendix

The Appellant is unaware of any related proceedings.

Respectfully submitted,

7 Dec 2006
Date

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Claims Appendix

Listing of Claims:

1. A process for preparing a composite material comprising mixing at least one natural fiber, at least one polypropylene resin, and at least one functionalized polypropylene coupling agent to provide said composite material; wherein said functionalized polypropylene coupling agent possesses a molecular weight distribution of greater than 2.5 (M_w/M_n by GPC) and comprises a base polypropylene resin that is grafted with a total of more than about 1 mmole of at least one polar monomer per 100 grams of functionalized polypropylene coupling agent.
2. The process of claim 1 wherein the natural fiber is selected from the group consisting of wood flour, wood fiber, and agricultural fiber.
3. The process of claim 1 wherein the natural fiber is selected from the group consisting of wood flour, wood fiber, hemp, flax, and kenaf.
4. The process of claim 1 wherein the natural fiber is employed at a level in the range of from about 20 to about 85 weight % based on the total formulation weight of the composite material.
5. The process of claim 1 wherein the base polypropylene resin is grafted with a total of more than about 5 mmole of at least one polar monomer per 100 grams of functionalized polypropylene coupling agent.

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6. The process of claim 1 wherein the base polypropylene resin is grafted with a total of more than about 10 mmole of at least one polar monomer per 100 grams of functionalized polypropylene coupling agent.

7. The process of claim 1 wherein the polypropylene resin is a polypropylene copolymer comprising a major proportion of propylene combined with a minor proportion of a second monomer selected from the group consisting of ethylene and C₄-C₁₆ monomer materials.

9. The process of claim 1 wherein the polypropylene resin is polypropylene homopolymer.

11. The process of claim 1 wherein the polar monomer is selected from the group consisting of ethylenically unsaturated carboxylic acids, ethylenically unsaturated carboxylic acid anhydrides, and derivatives of the foregoing.

12. The process of claim 11 wherein the polar monomer is selected from the group consisting of maleic acid, fumaric acid, itaconic acid, crotonic acid, acrylic acid, methacrylic acid, maleic anhydride, itaconic anhydride, substituted maleic anhydrides, and derivatives of the foregoing.

13. The process of claim 1 wherein the polar monomer is maleic anhydride.

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14. A composite material prepared by a process comprising mixing at least one natural fiber, at least one polypropylene resin, and at least one functionalized polypropylene coupling agent to provide said composite material; wherein said functionalized polypropylene coupling agent possesses a molecular weight distribution of greater than 2.5 (M_w/M_n by GPC) and comprises a base polypropylene resin that is grafted with a total of more than about 1 mmole of at least one polar monomer per 100 grams of functionalized polypropylene coupling agent.

15. A composite material comprising at least one natural fiber, at least one polypropylene resin, at least one functionalized polypropylene coupling agent, and at least one lubricant selected from the group consisting of fatty acid amides and fatty acid esters; wherein said functionalized polypropylene coupling agent possesses a molecular weight distribution of greater than 2.5 (M_w/M_n by GPC) and comprises a base polypropylene resin that is grafted with a total of more than about 1 mmole of at least one polar monomer per 100 grams of functionalized polypropylene coupling agent.

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Evidence Appendix

The Appellant does not submit any further evidence pursuant to 37 C.F.R. §§ 1.130, 1.131, or 1.132.

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Related Proceedings Appendix

No decisions rendered by a court or the Board in any proceeding identified pursuant to 37 C.F.R § 41.38(c)(1)(ii) are known to the Appellant.